DESIGN *and* CONTROL

of

HAYDITE CONCRETE

MIXTURES

HYDRAULIC-PRESS BRICK COMPANY

MANUFACTURERS OF

Lightweight Hydraulic Haydite aggregate

SAINT LOUIS, MO. SOUTH PARK, OHIO

A. I. A. File No. 4b

Design and Control of HAYDITE CONCRETE MIXTURES

What Is Haydite?

HAYDITE is an inert, uniformly graded product, made by burning clay or shale, which, when mixed with the proper quantity of Portland cement and water, produces strong, lightweight concrete.

How Haydite Is Manufactured

HAYDITE is manufactured from clay or shale which is taken from the pit or bank and ground to a maximum size of 1½ inches. The ground material is then delivered to and burned in a rotary kiln of the same type as is used in the manufacture of Portland cement.

The raw material travels continuously through the kiln, passing a preliminary heating stage and finally reaching a zone of highest heat near the discharge end of the kiln. The temperature at this point is about 2000 degrees F. In this zone incipient fusion takes place, the carbon content oxidizes, forming gases, resulting in the material expanding into a lightweight, cellular structure. This expansion process is so complete that the smallest particles show an ideal cellular structure when magnified.

The resultant product, HAYDITE, is a series of air cells, the partitions of which are thoroughly vitrified.

The product is discharged from the kiln in clinker form and is then taken to the preparation plant, where it is crushed, screened, and graded into standard commercial sizes for concrete.

General Information

SIZE OF SCREEN	SCREEN ANALYSIS STANDARD GRADING ACCUMULATED PER CENT RETAINED AGGREGATE SIZES			SCREEN ANALYSIS SPECIAL GRADING ACCUMULATED PER CENT RETAINED AGGREGATE SIZES		
	"A"—¼" x 00"	"B"—½" x ¼"	"C"—¾" x ¼"	"A-X"—⅜" x 00"	"B-X"—½" x 00"	"C-X"—¾" x 00"
100	85	100	100	95	94	98
48	75	100	100	88	90	96
28	60	100	100	76	83	92
14	40	100	100	58	71	86
8	10	100	100	30	51	74
4		75	95	4	24	53
⅜"		35	75		5	10
½"*			25			7
¾"						
F.M.	2.70	6.10	6.70	3.51	4.18	5.09

*Screen used to show grading, but not used in computing F.M.
Special grading for unusual work may be obtained.
Coef. of Expansion — .0000055. Values for shear, bond, compression and tension same as ordinary concrete.
Coef. of Conductivity (C) — 1.62 B. T. U's per hour per sq. ft area per inch thickness per degree F. difference.

Description and Approximate Weight of Haydite Aggregate

SIZE	WEIGHT CU. FT. DRY RODDED	REMARKS
"A"—¼" x 00"	60 lbs.	Sand size of Standard grading for concrete and concrete products
"B"—½" x ¼"	50 lbs.	Coarse size of Standard grading for concrete products
"C"—¾" x ¼"	48 lbs.	Coarse size of Standard grading for concrete
"A-X"—⅜" x 00"	58 lbs.	Special sand size for manufacture roof slabs
"B-X"—½" x 00"	55 lbs.	Special coarse to fine size, shipped mixed, for concrete products and concrete
"C-X"—¾" x 00"	53 lbs.	Special coarse to fine size, shipped mixed, for concrete.

PHYSICAL PROPERTIES	CHEMICAL ANALYSIS
Specific Gravity 2.52 Cellular Fused over 2000° F. Sharp (cuts glass) Resists acids Completely inert	Loss on Ign. . . . . 0.40% Silica (S_1O_2) . . . . . 65.40% Alumina (AL_2O_3) . . . . . 12.30% Iron Oxide (Fe_2O_3) . . . . 13.30% Lime (CaO) . . . . . 5.20% Magnesia (M_gO) . . . . . 2.77% Sulphur (SO_2) . . . . . 0.00% Alkalies ($AsNa_2O$) 0.65%

Design of Haydite Concrete Mixtures

We suggest that the water-cement ratio principle be followed in the design of HAYDITE concrete mixtures. The water-cement ratio curve published by the Portland Cement Association *is* applicable to HAYDITE concrete *providing allowance is made for the absorption of the Haydite aggregate.*

The effective absorption of HAYDITE aggregate is approximately 7% moisture by weight. This absorbed water Is NOT liberated in the mix by the HAYDITE aggregate and therefore does not become a part of the water-cement ratio.

Pre-Wetting

The effective absorption of the HAYDITE aggregate must occur before the cement is added to the mixture; therefore, it is advisable to thoroughly wet the HAYDITE aggregate in the pile. The HAYDITE aggregate in the pile should contain at least 10% moisture to insure an adequate supply for the absorption. All moisture, by weight, over 7% must be considered as free water, and, therefore, included in the water-cement ratio.

Determination of Mixtures

Table No. 1 indicates trial mixtures for field use when HAYDITE Sand, Size "A", and HAYDITE Coarse, Size "C", aggregate are to be used.

Table No. 2 indicates trial mixtures when Natural Sand and HAYDITE Coarse, Size "C", aggregate are to be used.

Table No. 3 indicates trial mixtures when a special grading of Coarse to Fine HAYDITE, Size "C-X", aggregate is to be used. (See screen analysis under General Information.)

These mixes are given as a guide only and should not be rigidly specified. As job conditions may require slightly different mixtures the actual proportions should be decided by trial on the job.

Proportions given are by volume, loose dry. If the aggregates are to be measured in a damp, loose condition, they will occupy a greater volume than when dry. The maximum bulking of the Size "A" Sand HAYDITE is approximately 22%, of the Size "C" Coarse HAYDITE approximately 3%, and of the Special Size "C-X" Coarse to Fine HAYDITE approximately 12½%.

The maximum bulking of Natural Sand is reached at about 6% moisture content and may be as much as 20% to 30%. The amount varies according to the Natural Sand used and should be determined for the particular type used.

Table No. 1

Using Haydite Sand Size "A" and Haydite Coarse Size "C" for Aggregate

28 Day Strength Lbs./Sq. In.	Slump Inches	Actual W/C Gallons	Approx. Absorption Gallons	Field W/C Gallons	Trial Mix Loose Dry Volumes	Sax Cement Per Cu. Yd.	Haydite Cu. Yd. by Volume, Loose Dry		Weight Per Cu. Ft.	E
							"A" Size ¼" x 00"	"C" Size ¾" x ¼"		
3,000	5–7	6	1¾	7¾	1–1½–2¼	8.45	.48	.70	100	1,500,000 to 2,000,000
3,000	2–4	6	2	8	1–1¾–2½	7.80	.50	.72	98	
2,500	5–7	6¾	2	8¾	1–1¾–2½	7.55	.49	.70	98	
2,500	2–4	6¾	2¼	9	1–2–3	6.70	.50	.75	97	
2,000	5–7	7½	2¼	9¾	1–2–3	6.50	.48	.72	97	
2,000	2–4	7½	2½	10	1–2¼–3¼	6.00	.50	.72	96	
1,650	5–7	8¼	2½	10¾	1–2¼–3¼	5.90	.49	.71	96	
1,650	2–4	8¼	2¾	11	1–2½–3½	5.45	.51	.71	96	

NOTE—Time of mix, one (1) minute after all ingredients, including water, are in the mixer.

Table No. 2

Using Natural Sand and Haydite Coarse Size "C" for Aggregate

28 Day Strength Lbs./Sq. In.	Slump Inches	Actual W/C Gallons	Approx. Absorption Gallons	Field W/C Gallons	Trial Mix Loose Dry Volumes	Sax Cement Per Cu. Yd.	Aggregate Cu. Yd. by Volume, Loose Dry		Weight Per Cu. Ft.	E
							Nat'l Sand ¼" x 00"	"C" Size ¾" x ¼"		
3,000	5–7	6	⅞	6⅞	1–1½–2¼	8.45	.48	.70	112	1,500,000 to 2,000,000
3,000	2–4	6	1	7	1–1¾–2½	7.80	.50	.72	111	
2,500	5–7	6¾	1	7¾	1–1¾–2½	7.55	.49	.70	111	
2,500	2–4	6¾	1¼	8	1–2–3	6.70	.50	.75	110	
2,000	5–7	7½	1¼	8¾	1–2–3	6.50	.48	.72	110	
2,000	2–4	7½	1⅜	8⅞	1–2¼–3¼	6.00	.50	.72	109	
1,650	5–7	8¼	1⅜	9⅝	1–2¼–3¼	5.90	.49	.71	109	
1,650	2–4	8¼	1½	9¾	1–2½–3½	5.45	.51	.71	109	

NOTE—Time of mix, one (1) minute after all ingredients, including water, are in the mixer.

Table No. 3

Using Haydite Special Size "C-X" for Aggregate

28 Day Strength Lbs./Sq. In.	Slump Inches	Actual W/C Gallons	Approx. Absorption Gallons	Field W/C Gallons	Trial Mix Loose Dry Volumes	Sax Cement Per Cu. Yd.	Haydite Cu. Yd. by Volume, Loose Dry — Special Size "C-X" ¾" x 00"	Weight Per Cu. Ft.
3,000	5–7	6	1¾	7¾	1–3	8.45	1.20	100
3,000	2–4	6	2	8	1–3.3	7.80	1.20	98
2,500	5–7	6¾	2	8¾	1–3.3	7.55	1.20	98
2,500	2–4	6¾	2¼	9	1–4	6.70	1.20	97
2,000	5–7	7½	2¼	9¾	1–4	6.50	1.20	97
2,000	2–4	7½	2½	10	1–4.4	6.00	1.20	96
1,650	5–7	8¼	2½	10¾	1–4.4	5.90	1.20	96
1,650	2–4	8¼	2¾	11	1–4.8	5.45	1.20	96

E 1,500,000 to 2,000,000

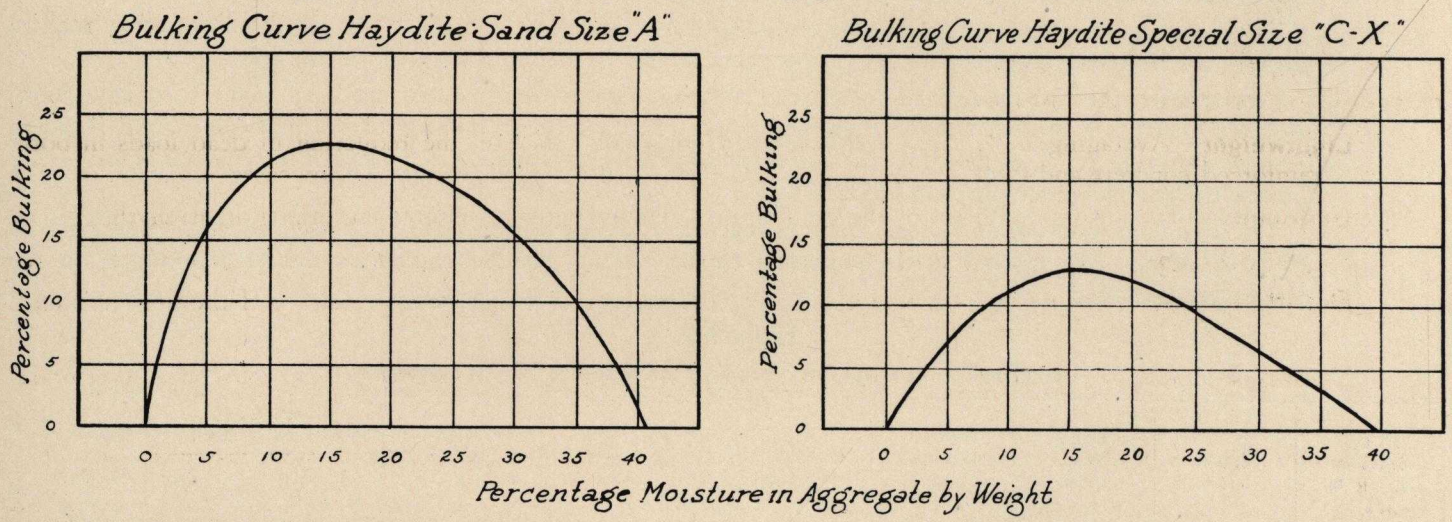
Note—Time of mix, one (1) minute after all ingredients, including water, are in the mixer.
Special Size "C-X" is a "coarse to fine" grading, shipped mixed.

Bulking

When moisture is added to Haydite aggregate, an increase in volume over the dry condition is obtained when the aggregate is measured loose, therefore, additional quantities must be added when measured in the damp, loose condition in order to obtain a quantity equivalent to the dry material.

The following curves give the approximate bulking of both the Haydite Sand Size "A" and Haydite Special Coarse to Fine Size "C-X" for various percentages of water.

The bulking of the Haydite Coarse Size "C" is negligible.



Mixing, Transporting and Placing

Mixing—Thorough mixing of Haydite concrete produces a uniform and homogeneous mass which is easily placed with a minimum amount of labor. Haydite concrete which has not been thoroughly mixed is usually harsh, unworkable and lacks the cohesiveness of good concrete.

The minimum time of mixing is ONE Full Minute. The effective time of mixing is from the time all the ingredients, including the water, are in the mixer.

If increased output is needed, it should be obtained by either larger or additional mixers, rather than speeding up or overloading the equipment on hand.

Transporting—We recommend that Haydite concrete be transported by buggies. Chuting causes a separation of ingredients even though the concrete has been thoroughly mixed.

Placing—The same precautions should be taken in the placing of Haydite concrete as are taken in the placing of natural aggregate concrete. Excessive rodding or puddling causes separation. We recommend the use of a vibrator as an aid in the proper placing of Haydite concrete.

Segregation

Causes of Segregation

1. Concrete not thoroughly mixed.
2. Mixture too wet.
3. Transporting.
4. Excessive rodding or puddling.

Prevention of Segregation

1. Mix until the mass is uniform in color and homogeneous. The longer HAYDITE concrete is mixed, the more workable it becomes, and consequently, less separation occurs.

2. HAYDITE is a Lightweight aggregate, so light, in fact, that a large per cent of the coarse aggregate FLOATS in water. Therefore, the higher the consistency, the greater the separation. The separation becomes severe when consistencies producing a slump greater than seven inches are used.

3. Rough runways will agitate wet mixes enough to cause the coarse aggregate to FLOAT to the top of the mixture in the buggy. This may be overcome by dumping the contents of the buggy on concrete which has already been placed and shoveling the newly deposited concrete into place.

4. Excessive rodding or puddling aids the coarse aggregate in working its way to the top of the mass. The use of a vibrator permits the use of a drier concrete, thus permitting more agitation and resulting in less separation.

Estimating Haydite Concrete

Haydite aggregate is sold by volume, dry, and is loaded in cars or trucks in this condition. Since the bulking of the aggregate does not take place until wetted down, no corrections in the unit dry prices are necessary in estimating the material costs; therefore, use the unit prices of the dry materials and the loose dry quantity requirements of the specified mixes as shown in Tables Nos. 1, 2 and 3, in estimating the cost. (Quantities may vary slightly either way according to amount of compacting in pouring.)

Instructions must be given to the field superintendent to provide for the bulking of the aggregate and to make the necessary field corrections in the proportions when mixing the materials. If this is not done, a much richer concrete will be obtained due to the increased proportion of cement, thus increasing the material costs considerably.

Advantages of Haydite Concrete

Lightweight—Averaging 30% lighter than natural aggregate concrete, the reduction in dead loads in both reinforced concrete and steel frame buildings has effected substantial savings in many cases.

Uniformity—The absolute control of the grading of HAYDITE aggregate assures uniformity in strength.

Pure and Clean—HAYDITE is chemically pure and devoid of silt or other impurities.

Fire Resistance—Tests by the National Board of Underwriters have completely established the fire resistance quality of HAYDITE concrete.

Durability—Repeated alternate freezing and thawing tests prove that HAYDITE concrete will not deteriorate under severe weather conditions.

Sound-Thermo Insulation—HAYDITE concrete is practically unequalled among fire resistant materials.

Haydite Sub-Floors or Floor Fills

Due to its lightweight and unusually high insulating properties, both sound and heat, HAYDITE concrete is ideal for sub-floors on structural slabs or tile floor arches.

HAYDITE aggregate contains no combustible matter, and is free of silt, sulphur and other impurities which are injurious to metals, thus permitting pipes, conduits, etc., to be embedded in the concrete without danger of corrosion.

HAYDITE concrete is a lightweight, fire-proof, insulating concrete, composed of HAYDITE aggregate, Portland cement and water.

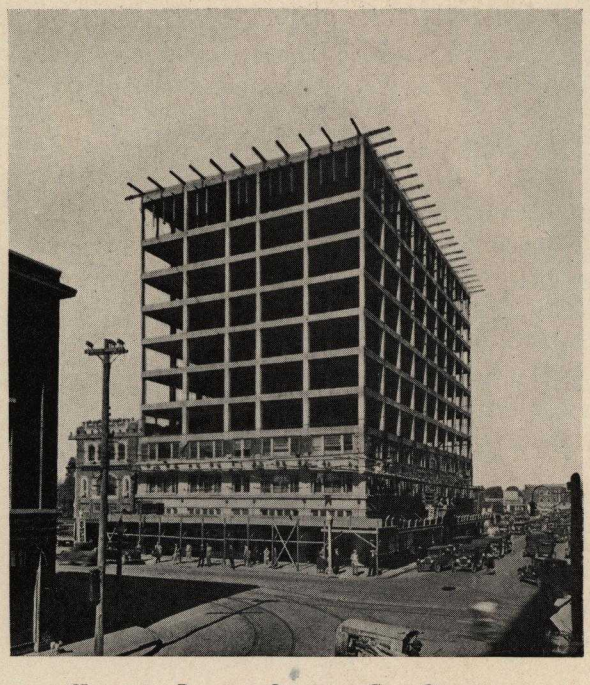
The following table indicates the approximate weights and strengths on a few suggested mixes:

MIX	TOTAL GALLONS WATER PER SAX CEMENT	SAX CEMENT PER CU. YD.	HAYDITE CU. YD. BY VOLUME LOOSE DRY			WEIGHT PER CU. FT.	28 DA. COMPRESSIVE STRENGTH LBS./SQ. IN.
			"A" ¼" x 00"	"C" ¾" x ¼"	"C-X" ¾" x 00"		
1–8	9½	3.5			1.00	70	900
1–4–6	9½	3.5	.52	.75		70	800
1–6–6	12	2.8	.62	.62		72	700
1–12	14½	2.4			1.00	71	600
1–6–8	14½	2.5	.52	.70		72	550
1–8–8	17	2.0	.60	.60		70	500

Drier mixes will reduce the weight per cubic foot.
Quantities shown may vary slightly either way according to compacting in placing.
Proportions shown are loose dry volume; correction for bulking must be made.
Time of mixing, pre-wetting, transporting and placing may be done in a manner similar to that for HAYDITE concrete as recommended elsewhere in this booklet.

Owing to its many advantages, the use of HAYDITE Concrete has resulted in substantial savings in construction in many cases, and in several instances made it possible to increase the number of additional stories added to older buildings. Its extreme lightness makes it ideal for use in floors and lift spans of bridges.

The few selected illustrations are to show the diversified uses where HAYDITE Concrete has been used to advantage.



HIGHTOWER BUILDING, OKLAHOMA CITY, OKLAHOMA

Hawk & Parr, *Architects* — Hans Von Unwerth, *Engineer*

The use of Haydite concrete permitted an addition of seven stories when only five could have been added if ordinary concrete had been used.

SOUTHWESTERN BELL TELEPHONE BUILDING, KANSAS CITY, MO.

Hoit, Price, Barnes, *Architects*—I. R. Timlin, *Assoc'd Architect*—C. A. Glass, *Eng'r*

The saving in dead load by the use of Haydite concrete permitted an addition of 14 stories, instead of 10½ stories if ordinary concrete had been used.

MADISON SQUARE BUILDING (*Center*), CHICAGO, ILL.

W. C. Zimmerman, *Architect on original building*

Hall, Lawrence & Ratcliffe, *Architects on addition*

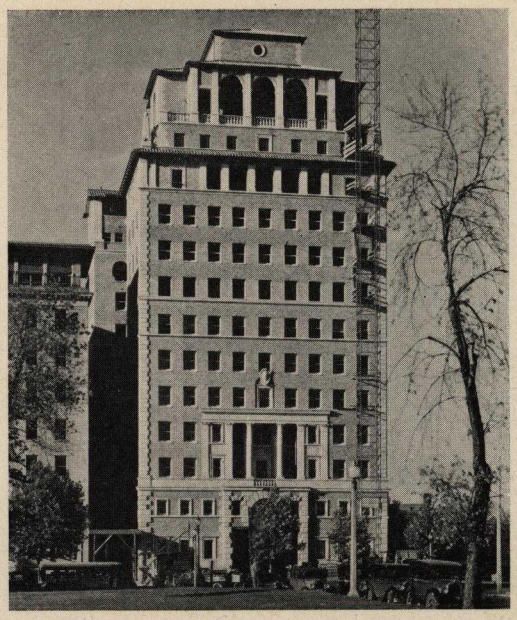
Haydite concrete used in upper seven stories, as an addition.

EQUITABLE BUILDING, DES MOINES, IOWA

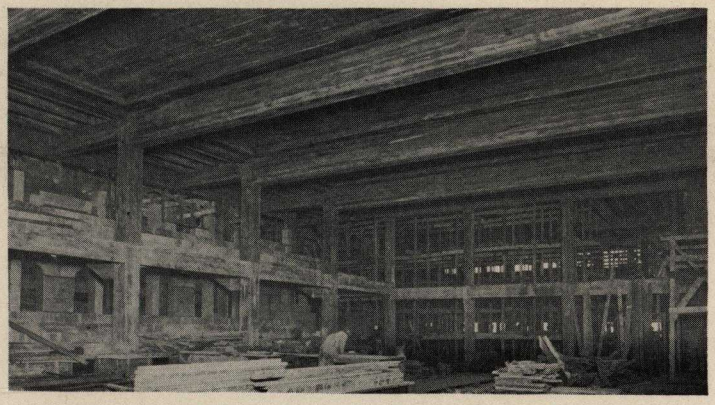
Proudfoot, Bird & Rawson, *Architects* — Harry Hartupe, *Engineer*

Haydite concrete used for all fire-proofing and floor construction.

PARK PLAZA HOTEL, ST. LOUIS, MO.
L. O. Schopp, E. J. Bauman, *Associated Architects*—Brussel & Viterbo, *Engineers*
Haydite concrete used for all fireproofing and floor construction



OSCAR JOHNSON INSTITUTE AND MCMILLAN HOSPITAL, ST. LOUIS, MO.
Jamieson & Spearl, *Architects* W. J. Knight & Co., *Engineers*
Haydite concrete used for all columns and floor construction above first floor



AUDITORIUM CENTRAL JUNIOR HIGH SCHOOL, KANSAS CITY, MO.
Chas. A. Smith, *Architect* Geo. E. McIntyre, *Engineer*
Haydite reinforced concrete 60-foot clear girder spans

CENTRAL DEPOSITORS BANK BUILDING ANNEX, AKRON, OHIO
Walker & Weeks, *Architects and Engineers*
Haydite concrete joists with clay tile filler

ADAMS EXCHANGE TELEPHONE BUILDING, COLUMBUS, OHIO
Mills, Rhines, Bellman & Hordoff, *Architects*
Haydite concrete used for fireproofing and floor construction in the two additional top stories

The following specifications are suggested, believing they will produce quality concrete without restricting the liberty of the contractor, as long as he produces workable mixes.

By controlling the water for a definite strength as against holding to a constant mix and varying the water, the Architect or Engineer is assured of quality product. When the constant mix is used, flowability and workability are obtained by changes in the water content, which also changes the quality. When the water remains constant, flowability and workability are controlled by a change in quantity of aggregate, thereby keeping the strength uniform.

Suggestions for Haydite Concrete Specifications

Unless otherwise specified or indicated on the plans, all concrete shall be made of Portland cement, HAYDITE aggregate and water.

The HAYDITE aggregate shall consist of HAYDITE Sand, Size "A", and HAYDITE Coarse, Size "C", or HAYDITE Special, Size "C-X", which shall be so graded that all particles of the HAYDITE Sand, Size "A", will pass a ¼" square mesh, and 95% of the HAYDITE Coarse, Size "C", a ¾" square mesh, with no appreciable amount of dust.

Cement and aggregate shall be stored at the works in a manner to prevent deterioration, the intrusion of foreign matter, or the mixing of the fine and the coarse aggregate.

Water used in mixing concrete shall be clean and free from strong acids, alkalies, oil or organic materials.

The working stresses for the design of this structure are based upon the minimum ultimate 28-day strength of the concrete to be used. The strength of concrete for which all parts of this structure were designed is shown on the several plans.

The strength of concrete shall be fixed in terms of the water-cement ratio, which shall not exceed the values shown in the following table:

Assumed Strength of Concrete

*W-C RATIO, U. S. GALLONS PER SAX OF CEMENT (94 LBS. NET)	ASSUMED COMPRESSION STRENGTH AT 28 DAYS IN POUNDS PER SQ. IN.
6	3,000
6¾	2,500
7½	2,000
8¼	1,650

*The absorption of HAYDITE aggregate is approximately 7% by weight. This absorbed water is not liberated in the mix by the HAYDITE aggregate and therefore does not become a part of the water-cement ratio; all moisture over this 7%, however, should be considered as surface water and must be included as part of the mixing water in computing the quantity of water required to maintain the water-cement ratio.

The strengths indicated above are for average job specimen, cured damp at a temperature of 70° F.

The proportions of HAYDITE aggregate to cement for concrete of any water-cement ratio shall be such as to produce concrete that will work readily into corners and angles of the form and around the reinforcement without excessive puddling or spading and without permitting the material to segregate or free water to collect on the surface. The combined aggregate shall be of such composition of sizes that when separated by the No. 4 standard sieve the weight retained on the sieve shall not be less than 1/3, nor more than 2/3, of the total, nor shall the amount of coarse material be such as to produce harshness in placing or honeycombing in the structure.

All concrete throughout shall be mixed in an approved type of power operated batch mixer which will insure a uniform distribution of the materials throughout the mass. The HAYDITE aggregate, both sand and coarse sizes, shall be thoroughly wetted down in the pile before going to the mixer, and the mixing must continue for at least one (1) full minute after all ingredients, including water, are in the drum, and until concrete of a uniform consistency and color is produced.

All materials, including water, shall be measured in a manner that will insure accurate and uniform proportions of each of the materials at all times.

Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients, excepting that chuting will not be permitted at any time.

Under no circumstances shall concrete which has partially hardened be deposited in the work.

Concrete shall be thoroughly compacted by puddling with suitable tools during the operation of placing, and thoroughly worked around the reinforcement, around the embedded fixtures, and into the corners of the forms. (NOTE. The use of a vibrator is recommended as an aid in placing HAYDITE concrete.)

When it is desirable to include field test of concrete, curing, depositing in cold weather, or forms and details of construction, we suggest that the specifications as recommended by the Portland Cement Association in their booklet, "Design and Control of Concrete Mixtures," be incorporated, and when admixtures are used, include the manufacturer's directions.

HAYDITE AND HAYDITE CONCRETE DATA

FOR ARCHITECTS, ENGINEERS, CONTRACTORS AND BUILDERS

HAYDITE AGGREGATES ARE SOLD BY VOLUME AND MIXES ARE DESIGNED BY VOLUME

HAYDITE AGGREGATE

SIZE	WT./CU. FT.	REMARKS
1/8"	63# DAMP	USED FOR TOPPING FLOORS, STUCCO, PLASTER, ETC.
3/16"	60# DAMP	REGULAR SAND GRADE "A" FOR CONCRETE AND CONCRETE PRODUCTS.
1/2"	52# DAMP	GRADE "B" USED AS COARSE AGGREGATE IN CONCRETE PRODUCTS.
3/4"	50# DAMP	GRADE "C" USED AS COARSE AGGREGATE FOR CONCRETE.

SCREEN ANALYSIS

SCREEN	1/8"	3/16"	1/2"	3/4"
PASSING 100	12.5	7.5		
48	15.5	10.3		
28	22.0	16.7		
14	33.0	23.0		
8	17.0	29.0		
4		13.0	15.0	5.0
3/8"			50.0	41.0
1/2"			35.0	33.0
3/4"				21.0
F. M.	2.265	2.95	6.20	6.70

PHYSICAL PROPERTIES, SP. GR. 2.52 CELLULAR, FUSED AT 2400° F., SHARP (CUTS GLASS), RESISTS ACIDS, COMPLETELY INERT.

CHEMICAL ANALYSIS OF HAYDITE AGGREGATE

LOSS ON IGN.	.40
SILICA (S_1O_2)	65.40
ALUMINA(AL_2O_3)	12.30
IRON OXIDE (FE_2O_3)	13.30
LIME (CaO)	5.20
MAGNESIA (M_6O)	2.77
SULPHUR (SO_2)	0.00
ALKALIES ($AsNa_2O$)	0.65

HAYDITE CONCRETE

MIX	CEMENT PER CU. YD.	HAYDITE/CU. YD. BY VOLUME		MIXING WATER GALLONS PER SAX CEMENT	SLUMP	WT. PER CU. FT.	ABSORPTION	E	ULTIMATE COMPRESSION # □" 6"X12" CYLINDERS			
		3/16"	3/4"						7 DAYS	14 DAYS	28 DAYS	60 DAYS
1-1 -2	9.75 SAXS	.36 CU. YDS	.72 CU. YDS	4.5	8½"	106		1,500,000 TO 2,000,000	2837	3527	3890	4315
1-1½-2½				3.5	6½"	100			2137	2703	3162	
1-1½-3	7.07 SAXS	.39 CU. YDS	.78 CU. YDS	3.5	7½"	101			1952	2585	2873	3480
1-2 -2	7.61 SAXS	.56 CU. YDS	.57 CU. YDS	3.5	6½"	102			2025	2375	2730	3545
1-2 -3	6.70 SAXS	.50 CU. YDS	.75 CU. YDS	3.0	6 "	99	3.00%		2123	2525	3225	3518
1-2 -3½	6.14 SAXS	.47 CU. YDS	.82 CU. YDS	3.0	6½"	100	3 65%		1587	2122	2465	2913
1-2 -4	5.85 SAXS	.45 CU. YDS	.88 CU. YDS	3.25	6 "	98	3.35%		1317	1885	2345	2574

NOTE—

COEF. OF EXPANSION = .0000055. VALUES FOR SHEAR, BOND, SAME AS ORDINARY CONCRETE.
COEF. OF CONDUCTIVITY (C) = 1.62 BTU'S PER HOUR PER SQ. FT. PER INCH THICKNESS PER DEGREE F. DIFF.

HAYDITE MUST ALWAYS BE THOROUGHLY WETTED IN THE PILE BEFORE GOING TO THE MIXER.
MIXING WATER SHOWN ABOVE IS THE AMOUNT ADDED IN THE MIXER AFTER HAYDITE HAS BEEN SATURATED.

HAYDITE CONCRETE SHOULD BE MIXED A FULL MINUTE AFTER ALL MATERIALS ARE IN MIXER.

HAYDITE MORTAR

MIX BY VOLUME	WT./CU. FT.	TENSILE STRENGTH				ULTIMATE COMPRESSION # 1 □"			
		7 DAYS	14 DAYS	28 DAYS	60 DAYS	7 DAYS	14 DAYS	28 DAYS	60 DAYS
1—1	110					3900	4330	5442	
1—2	107	450	560	585	605	3252	3867	4124	4525
1—3	104	412	485	545	585	1927	2305	2760	3117

TEST DATA SHOWN ABOVE ARE AVERAGE VALUES OF AUTHORITATIVE TESTS ON FILE.

HYDRAULIC-PRESS BRICK COMPANY

MANUFACTURERS AND DISTRIBUTORS

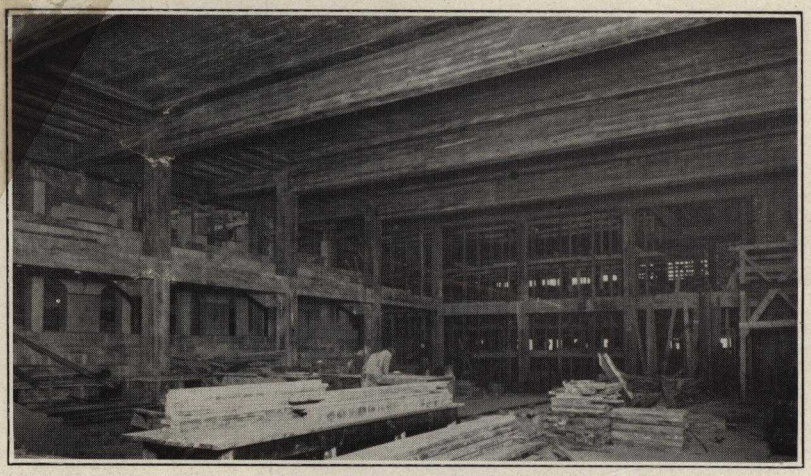
CENTRAL NATIONAL BANK BLDG.

ST. LOUIS, MO.

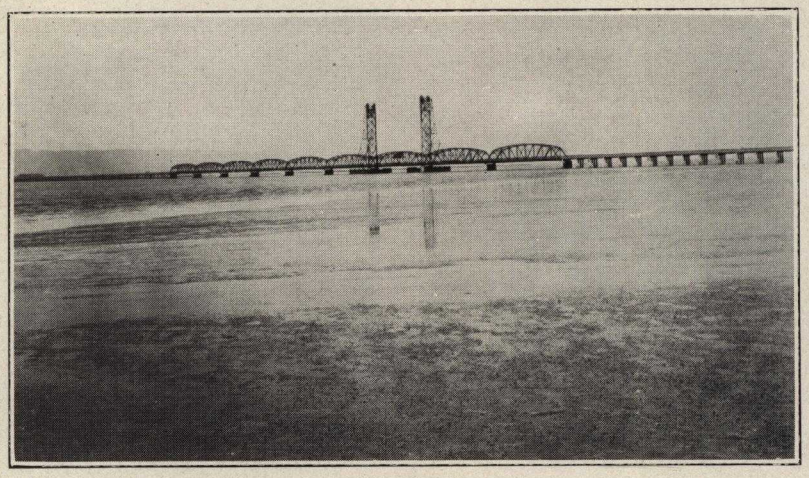
Owing to its many advantages, the use of HAYDITE Concrete has resulted in substantial savings in construction in many cases, and in several instances made it possible to increase the number of additional stories added to older buildings. Its extreme lightness makes it ideal for use in floors and lift spans of bridges.

The few selected illustrations are to show the diversified uses where HAYDITE Concrete has been used to advantage.

Interior view of auditorium showing HAYDITE reinforced concrete, 60 foot clear girder spans, flat slab floors.



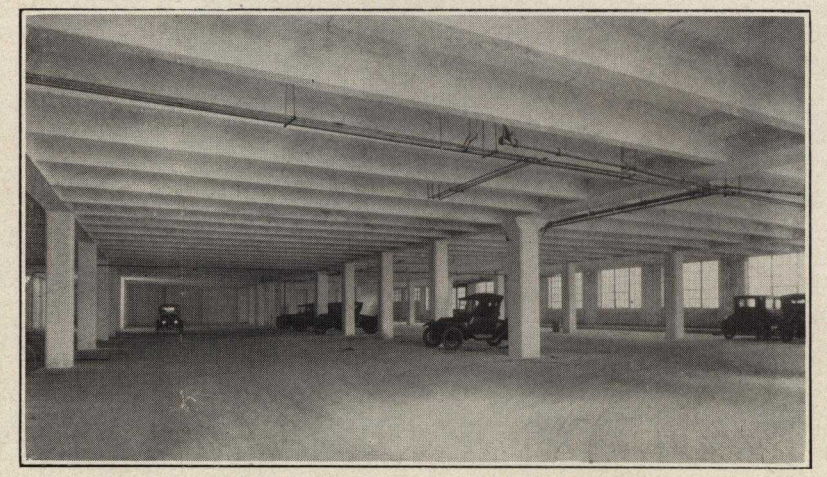
AUDITORIUM—CENTRAL JUNIOR HIGH SCHOOL
KANSAS CITY, MO.
CHAS. A. SMITH, ARCHITECT GEO. E. McINTYRE, ENGINEER



HAYDITE Concrete used in Lift span.

DUMBARTON BRIDGE
SAN FRANCISCO, CALIFORNIA
HARRINGTON, HOWARD & ASH, ENGINEERS

Interior view of garage built entirely of HAYDITE concrete, with 40 foot clear girder spans.

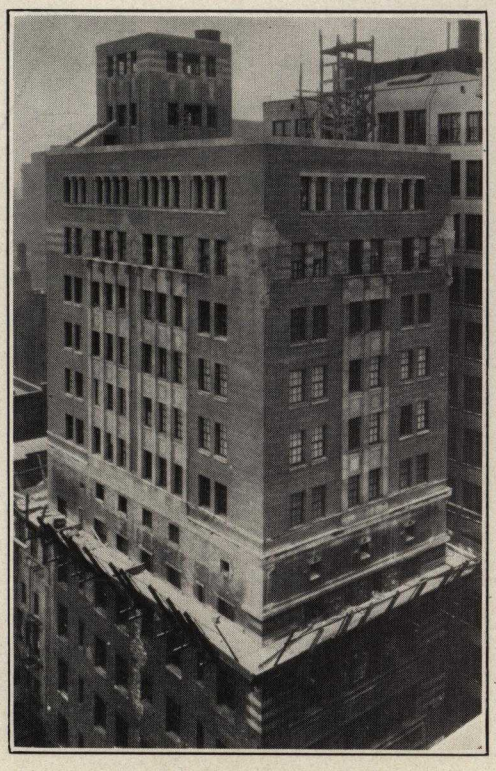


POST OFFICE GARAGE, KANSAS CITY, MO.
WILLIAM J. KOCH, ARCHITECT GEO. E. McINTYRE, ENGINEER

In this 18 story structural steel frame building HAYDITE concrete used for all fireproofing and floor construction.

EQUITABLE BUILDING
DES MOINES, IOWA
PROUDFOOT, BIRD & RAWSON, ARCHITECTS
HARRY HARTUPE, ENGINEER

In the 16 story reinforced concrete frame building shown below, HAYDITE concrete used in all columns and flat slab floor construction.



CHICAGO ATHLETIC CLUB
CHICAGO, ILLS.
SCHMIDT, GARDEN & ERICKSON, ARCHITECTS & ENGINEERS

The use of HAYDITE concrete permitted an addition of six floors to the structure on the left, when only four could have been added if ordinary concrete had been used.

THE ALADDIN HOTEL
KANSAS CITY, MO.
P. T. DROTTS, ARCHITECT HARRY A. NOBLE, ENGINEER

What Is Haydite?

HAYDITE is a light weight burned clay aggregate, specially manufactured for use in concrete and concrete products in place of sand, gravel, stone, slag or cinders.

How Haydite Is Manufactured

HAYDITE is manufactured from clay which is taken from the bank and ground to a maximum size of 1½ inches. The ground clay is then delivered to and burned in a rotary kiln of the same type as is used in the manufacture of Portland cement, the kiln revolving as the clay is being delivered to the upper end.

The clay travels continuously through the kiln, passing a preliminary heating stage and finally reaching a zone of highest heat near the discharge end of the kiln. The temperature at this point is about 2000 degrees F. In this zone incipient fusion takes place, the carbon contents oxidizes forming gases, resulting in the clay expanding into a light weight, cellular structure. This expansion process is so complete that the finest particles show an ideal cellular structure when magnified.

The resultant product, HAYDITE, is a series of air cells, the partitions of which are thoroughly vitrified, fused clay and of great structural strength.

The product is discharged from the kilns in clinker form and is then taken to the preparation plant, where it is ground, screened and graded into all the standard commercial sizes used in concrete.

Advantages of Haydite Concrete

Lightweight	Averaging 30% lighter than natural aggregate concrete, the reduction in dead loads in both reinforced concrete and structural steel frame buildings has effected substantial savings in many cases.
Uniformity	The absolute control of the grading of HAYDITE assures uniformity in strength.
Pure and Clean	HAYDITE is chemically pure and devoid of silt or other impurities.
Fire Resistance	Complete tests by the National Board of Underwriters have completely established the fire resistance quality of HAYDITE concrete.
Durability	Repeated alternate freezing and thawing tests prove that HAYDITE concrete will not deteriorate under severe weather conditions.
Absorption	Due to the cellular structure of the aggregate, HAYDITE concrete is low in absorption and devoid of capillary attraction.
Sound—Thermo Insulation	HAYDITE concrete is practically unequalled among fire resistant materials.

HYDRAULIC-PRESS BRICK COMPANY

MANUFACTURERS AND DISTRIBUTORS

HAYDITE AGGREGATE

PLANTS

EAST ST. LOUIS, ILLS. SOUTH PARK, OHIO